

REMARKS

1. The Final Office Action of March 23, 2007 is hereby acknowledged. The shortened statutory period of three (3) months time period for response to the Office Action expired on June 23, 2007. Concurrently with the filing of this Continuation Application and Preliminary Amendment, the Applicant has requested a two-month extension of time and has paid the appropriate fee. Therefore, the deadline for filing the response is August 23, 2007. This Continuation Application is being mailed by Express Mail, Mail Label No. EM 077737168 US in a postage paid envelope addressed to Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 6, 2007. Therefore, this Continuation Application and Preliminary Amendment are timely filed. In the event that the Commissioner for Patents should determine that any additional extension of time is required for this Continuation Application and Preliminary Amendment to be timely filed and an appropriate fee is due for that extension of time, then the Commissioner for Patents is hereby authorized to charge Deposit Account Number 18-2222 for such appropriate fee.

2. The Applicant encloses a check in the amount of \$395.00 for the appropriate continued examination fee. In the event that the Commissioner for Patents should determine that any additional fee is due, then the Commissioner for Patents is hereby authorized to charge Deposit Account Number 18-2222 for such appropriate fee.

3. The original '101 Application had a total of 22 claims wherein one was an independent claim. Through this Preliminary Amendment, the '101 Application now has 21 total claims with one independent claim. Accordingly, no additional filing fee is due. In the event that the Commissioner for Patents should determine that any additional fee is due, then the Commissioner for Patents is hereby authorized to charge Deposit Account Number 18-2222 for the appropriate fee.

1           4.       The Patent Examiner's very detailed analysis of the '101 Application is  
2 acknowledged with appreciation. The Applicants will first address the rejection of Claim 1,  
3 since Claim 1 is the only independent claim and the rest of the claims of the '101 Application  
4 all depend from Independent Claim 1.

5           The Examiner is rejecting Claim 1 under 35 U.S.C. 102 (b) as being  
6 anticipated by United States Patent No.: 4,126,451 issued to Nayar for "Manufacture Of  
7 Plates By Powder-Metallurgy" (hereafter the "Nayar Patent"). After carefully reviewing the  
8 Nayar Patent, the Applicants respectfully disagree with the rejection since the '101  
9 Application is technically and structurally different from the Nayar Patent. The Applicants  
10 will illustrate their structural differences in Section 6 of this Amendment. However, in order  
11 to further differentiate the '101 Application from the Nayar Patent, the Applicants have  
12 amended the preamble and steps "a" and "d" of Claim 1. Therefore, through this  
13 amendment, amended Claim 1 is now more particularly and distinctly defined so as to  
14 overcome the technique rejection of the cited Nayar Patent. The amended Claim 1 is  
15 presented in Section 5 of this Amendment. The Applicants will discuss why the presently  
16 amended Claim 1 and the rest of the claims of the '101 Application are patentable in the  
17 Sections 6 and 7 respectively.

18  
19           5.       Through this Amendment the Applicants have amended the preamble and  
20 steps "a" and "d" of Claim 1 so that they now read:

- 21           "1.       A method of producing a framed-metal-matrix-composite-plate/sheet from a  
22 powder mixture, said method comprising"  
23           a.       producing said powder mixture by mixing a matrix metal powder and  
24 at least one reinforcement material, wherein said reinforcement  
25 material is selected from the group consisting of silicon carbide,  
26 silicon nitride, titanium nitride, titanium carbide, titanium silicide,  
27 molybdenum silicide, nickel aluminate, boron carbide, aluminum  
28 nitride, aluminum oxide, magnesium oxide, gadolinium oxide, ceramic

materials and mixtures thereof;"

"d. rolling said framed-billet to form said framed-metal-matrix-composite-plate/sheet without edge cracks, wherein said plate/sheet is comprised of thin skins of said frame metal, as compared with said metal-matrix-composite as a core of said plate/sheet."

The Applicants believe that the amendment of the above amended steps "a" and "d" of Claim 1 is allowable since it is supported by the disclosure in the '101 Application. Regarding the amended step "a", it is combined with contents of the prior step "a": "producing said powder mixture by mixing a matrix metal powder and at least one reinforcement material," and the prior dependent Claim 4. The prior Claim 4 is supported by the following disclosure: "The reinforcement material is selected from the group consisting of silicon carbide, silicon nitride, titanium nitride, titanium carbide, titanium silicide, molybdenum silicide, nickel aluminate, boron carbide, aluminum nitride, aluminum oxide, magnesium oxide, gadolinium oxide, ceramic materials and mixtures thereof." (Page 7, lines 26 to Page 8, line 2).

In terms of the amended step "d", it has been amended from combining the prior claim elements: "rolling said framed-billet to form said framed-metal-matrix-composite-sheet/plate without edge cracks," with addition of a new limitation: "wherein said plate/sheet is comprised of thin skins of said frame metal, as compared with said metal-matrix-composite as a core of said sheet/plate". The added limitation is supported by the disclosure of the '101 Application: "The box-framed MMC billet is rolled to produce sandwich structure sheet that has thin skins of said frame metal and a MMC core that is about 100% theoretical density" (Page 9, lines 3-4).

In conclusion, the above illustration demonstrates that the amendment of steps "a" and "d" of Claim 1 is based on the specification of the "101 Application, which was filed on November 18, 2003, and the amendment does not introduce new matter. Therefore, this

Amendment is in compliance with 35 U.S.C. 112, and the amended Claim 1 is allowable.

6. The Applicants will now provide an analysis as to why the amended Claim 1 is patentable over the Nayar Patent. In the analysis, the Applicants will first point out the structural differences between the amended steps "a" and "b" of the '101 Application and the Nayar Patent in the following Table 1.

**Table 1** The structural differences between the amended steps "a" and "b" of the '101 Application and the Nayar Patent

The '101 Application	the Nayar Patent																											
<p>"a. producing said powder mixture by mixing a matrix metal powder and at least one reinforcement material, wherein said reinforcement material is selected from the group consisting of silicon carbide, silicon nitride, titanium nitride, titanium carbide, titanium silicide, molybdenum silicide, nickel aluminate, boron carbide, aluminum nitride, aluminum oxide, magnesium oxide, gadolinium oxide, ceramic materials and mixtures thereof";</p>	<p><b>First:</b> "Further, the present invention is applicable to special compositions, such as dispersion-strengthened alloys and mixtures of metal elements and non-metallic compounds which are usually made by powder-metallurgy process" (col. 4, lines 1-5); <b>Second:</b> "The invention will be more completely understood from a discussion of the following specific examples of its application." (Col. 8, lines 48-50); <b>Third:</b> "EXAMPLE 1, In this example, the powder layer was commercially pure chromium powder ..."; "EXAMPLE 2, The powder was a uniform mixture of 89% by weight of the chromium powder of Example 1 and 11% by weight of iron powder..."; "EXAMPLE 5, The powder was FerroTic compound..."; EXAMPLE 8, The powder was prepared alloy comprising chromium, 23.4% iron, less than 1% other metallic elements,..."</p>																											
<p>"d. rolling said framed-billet to form said framed-metal-matrix-composite-plate/sheet without edge cracks, wherein said plate/sheet is comprised of thin skins of said frame metal, as compared with said metal-matrix-composite as a core of said plate/sheet."</p>	<p>"TABLE II (col. 14, lines 37-63)</p> <table><tr><td>Example:</td><td>T<sub>D</sub> (in) of Die</td><td>T<sub>M</sub> (in) of Powder</td></tr><tr><td>1A</td><td>1.25</td><td>0.75</td></tr><tr><td>2A</td><td>2.008</td><td>1.212</td></tr><tr><td>3</td><td>2.010</td><td>1.294</td></tr><tr><td>4</td><td>2.010</td><td>1.242</td></tr><tr><td>5</td><td>1.292</td><td>0.654</td></tr><tr><td>6</td><td>2.100</td><td>1.364</td></tr><tr><td>7</td><td>1.292</td><td>0.624</td></tr><tr><td>8</td><td>2.0</td><td>1.25"</td></tr></table>	Example:	T <sub>D</sub> (in) of Die	T <sub>M</sub> (in) of Powder	1A	1.25	0.75	2A	2.008	1.212	3	2.010	1.294	4	2.010	1.242	5	1.292	0.654	6	2.100	1.364	7	1.292	0.624	8	2.0	1.25"
Example:	T <sub>D</sub> (in) of Die	T <sub>M</sub> (in) of Powder																										
1A	1.25	0.75																										
2A	2.008	1.212																										
3	2.010	1.294																										
4	2.010	1.242																										
5	1.292	0.654																										
6	2.100	1.364																										
7	1.292	0.624																										
8	2.0	1.25"																										

It is clear by reviewing Table 1 that step "a" of the '101 Application claims the mixture of the powder which is comprised of a matrix metal powder and at least one reinforcement material, wherein said reinforcement material is selected from the group

1 consisting of silicon carbide, silicon nitride, titanium nitride, titanium  
2 silicide, molybdenum silicide, nickel aluminate, boron carbide, aluminum  
3 oxide, magnesium oxide, gadolinium oxide, ceramic materials and mixtures thereof. The  
4 claimed mixture of the chemical compositions of the '101 Application is new and not  
5 anticipated by the Nayar Patent.

6 The general disclosure of the Nayar Patent is: "*the present invention is applicable to*  
7 *special compositions, such as dispersion-strengthened alloys and mixtures of metal elements*  
8 *and non-metallic compounds which are usually made by powder-metallurgy process*" (col. 4,  
9 lines 1-5). The composition examples cited by the Nayar Patent do not disclose the powder  
10 composition, which is consisting of "*such as dispersion-strengthened alloys and mixtures of*  
11 *metal elements and non-metallic compounds which are usually made by powder-metallurgy*  
12 *process*". Instead, the Nayar Patent specifically discloses "*chromium powder*" in Examples  
13 1, 3 and 7, "*chromium powder and iron powder*" in Examples 2, 4, 6 and 8, and "*FerroTic*  
14 *compound*" of the powder in Example 5 from the entire example section, wherein the  
15 contents in all the examples are missing the generally disclosed "*non-metallic compounds*".  
16 Therefore, the disclosed samples are in complete contrast to the above mentioned general  
17 disclosure of the Nayar Patent.

18 Additionally, the Nayar Patent does not claim "*mixtures of metal elements and non-*  
19 *metallic compounds*" as the structural elements in its claims, under another statement:  
20 "*Although the invention has been described with reference to a number of specific examples,*  
21 *the invention is not limited to any of the particular forms or materials disclosed by ways of*  
22 *illustration, but only as defined in the claims*" (col. 14, lines 13-17).

23 Therefore, it is clear that the Nayar Patent does not intend to include the non-metallic  
24 compounds as part of its invention and the claimed elements of the reinforcement materials  
25 of Claim 1 of the '101 Application which are non-metallic compounds are not made obvious  
26 in view of the Nayar Patent. The above conclusion is consistent with the court findings:  
27 "*limitation from the specification are not read into the claims for the purpose of avoiding the*  
28 *art*", *In re Sporck*, 155 USPQ 687.

Furthermore, the above conclusion is consistent with the United States Patent and Trademark Office rules on inventions regarding chemical compositions, in that the claims of the chemical compositions must not be open-ended. It is clear that the '101 Application follows the rules since it specifically uses the claim language "wherein said reinforcement material is selected from the group consisting of silicon carbide, silicon nitride, titanium nitride, titanium carbide, titanium silicide, molybdenum silicide, nickel aluminate, boron carbide, aluminum nitride, aluminum oxide, magnesium oxide, gadolinium oxide, ceramic materials and mixtures thereof".

Compared with each of the limited specific non-metallic compounds from Claim 1, it is clear that those specific non-metallic compounds are not anticipated by the generally disclosed "non-metallic compounds" of the Nayar Patent. Therefore, this difference also leads to the conclusion that step "a" is patentable over the Nayar Patent.

In addition to the structural differences in the chemical compositions of the powder between the '101 Application and the cited Nayar Patent, the structural characteristics of the final product plate/sheet of the '101 Application are also different from those of the Nayar Patent.

The produced plate or sheet shown in Figures 5 and 6 in the Nayar Patent is comprised of at least one backing layer and a dense layer of the consolidated metal or metal alloy powder. The backing layer is the punch of the die, which is used for compressing the powders. As disclosed in the Nayar Patent, "*The punches are compressed substantially flush with the surface of the die, but the thickness of the die and the elongation of the powder are essentially unchanged*" (col. 7, lines 45-47). The thickness of the punch is defined as:  $T_D$ , whose values are listed in Table II of the Nayar Patent, in addition to the thickness  $T_M$  of the powder, wherein the thickness of  $T_D$  and  $T_M$  are also listed in Table 1 of this Amendment.

From the listed thickness of the punch, as compared with the thickness of the powder, it is clear that the punch is approximately twice as thick as the powder. Therefore, it is clear that the punch is thicker than the core of the metal powder after the metal powder is

1 compressed since the thickness of the punch is unchanged during the compressing process.  
2 In addition, the punch is the "skin" of the final product of the Nayar Patent.

3 Therefore, the mechanical structure of the product of the Nayar Patent is substantially  
4 different from that of the '101 Application. This is because the '101 Application specifically  
5 discloses a structural character of "thin skins of said frame metal and a MMC core", as  
6 compared with the skin which is thicker than the compressed metallic powder of the Nayar  
7 Patent. Therefore, this analysis proves that the claimed structural character of the '101  
8 Application is new and not anticipated by the Nayar Patent.

9 Based on such structural difference, and in accordance with 35 U.S.C. 102 and the  
10 below cited court findings on interpretation of "anticipation: *"If one prior art reference*  
11 *completely embodies the same process or product as any claim of the patent in suit, the*  
12 *process or product recited by the claim is said to be "anticipated" by the prior art, and the*  
13 *claim is therefore in valid under 102 for want of novelty"*, *Shatterproof Galss Corp. v.*  
14 *Libbny-Owens Ford Co.* 225 USPQ 635, 644 ( Page 637, the First Column), and *"Invalidity*  
15 *for anticipation requests that all of the element and limitation of the claim are found with a*  
16 *single prior art reference"*, and *"there must be no difference between the claimed invention*  
17 *and reference disclosure, as viewed by a person of ordinary skill in the field of invention"*,  
18 *Scripps Clinic v. Genentech Inc.*, 18 USPQ2d, 1001, 1016 (Page 1010, the First column), the  
19 independent Claim 1 of the '101 Application is patentable over the Nayar Patent. This is  
20 because the compositions and the structural features of the '101 Application are both  
21 substantially different from the Nayar Patent, which result in the product and process of the  
22 '101 Application being different from those of the Nayar Patent.

23 In conclusion, the above analysis proves that there are structural differences between  
24 the presently amended independent Claim 1 of the '101 Application and the Nayar Patent by  
25 providing sufficient evidence including a comparison of the structural differences.  
26 Therefore, Claim 1 of the '101 Application is patentable over the Nayar Patent.

27 In addition, the Applicants wish to summarize the overall differences between the  
28 Nayar Patent and the '101 Application as follows:

1 (a) Differences in invention purposes:

- 2 - The Nayar Patent: Applying rolling mill to consolidate powder of hard-to-  
3 work metal and metal alloys, such as chromium and its alloys, into plates  
4 inside a die (Abstracts).  
5  
6 - The '101 Application: Increasing yield rate of rolling consolidated framed  
7 metal matrix composite billets into sheets/plates (Abstracts).  
8

9 (b) Differences in material compositions:

- 10 - The Nayar Patent: Applying metal powder including elements: Ti, Zr, Nb, Ta,  
11 Cr, Mo, W, Rh, Fe, Os, Ro, Ir, Ni, Pa, Pt and their alloys (Claim 5), which all  
12 have melting temperature higher than 1100°C.  
13  
14 - The '101 Application: Applying (1) metal matrix powder including elements:  
15 Al, Mg, Cu, Fe, Zn, Ni, Co, Ti and alloys thereof, wherein the aluminum  
16 melting temperature is 660°C, and (2) the reinforcement particles as: silicon  
17 carbide, silicon nitride, titanium nitride, titanium silicide, molybdenum  
18 silicide, nickel aluminate, boron carbide, aluminum nitride, aluminum oxide,  
19 magnesium oxide, gadolinium oxide, ceramic materials and mixtures thereof.  
20 The reinforcement particles have the physical shapes of particulate, whiskers  
21 and mixtures.  
22

23 (c) Differences in tooling die:

- 24  
25 - The Nayar Patent: Closed die with two punches (Figures 1 and 2; Col. 2, line  
26 37). The tooling has specific requirements for the die and punch  
27 configurations and dimensions, such as  $dp$ ,  $di$ , ratio  $i=dp/di$   $Tm$  and  $Tp$   
28



(Figure 1 and 2; Col. 2, lines 50-55; Claim 13). The punches are thicker than the powder layer in consolidating. The die and punches are made of stainless steel or nickel alloy (Col. 8, lines 52-53; Col. 9, lines 1-6). The die and punch metals are not similar to the metal of the powder.

- The '101 Application: Opened metal frame or closed metal box (Figure 2; Claims 10, 11 and 12). The metal frame is made of a metal similar to the matrix metal, such as aluminum (P. 8, line 17).

(d) Differences in manufacturing methods:

- The Nayar Patent:

1. Mixing metal powder.
2. Consolidating metal powder mixture in the closed die with two punches by rolling the punches into the die. Protrusion ratio of the punches is determined by  $P/(1-\rho_c)T_M$ , where  $P$  is the total distance which the two punches protrude from the die,  $T_M$  is the thickness of the powder,  $\rho_c$  is the density of the powder (Claims 11 and 12; Col. 7, lines 25-37).
3. Consolidation temperature is about 1200°C (Col. 7, line 19).
4. The consolidated metal powder is not required to be metallurgically bonded with the die.

- The '101 Application (see the contents of Claim 1).

7. The rest of the claims of the '101 Patent including Claims 2-3, and 5-22 are

1 also patentable, since they are all dependent claims that depend from allowable Claim 1.  
2 Therefore, all include the limitations of steps "a" and "d" of Claim 1, which makes them  
3 allowable over the prior art cited in the Final Office Action. Specifically, Claims 2, 3, 5, 7-  
4 15, and 17-21 are patentable over the Nayar Patent; and Claims 3 and 6 are patentable over  
5 the combination of the Nayar and Lowrance Patent. Claims 6 and 22 are patentable over the  
6 combination of the Nayar and Lowrance Patent. Claims 6 and 22 are patentable over the  
7 combination of the Nayar Patent and the Japanese Patent: JP61194101A.  
8

9 8. Through this Amendment the Applicants have defined the claims of the  
10 invention more particularly and distinctly so as to overcome the technique rejection.  
11 Since the claims define a novel structure which is new and not anticipated by the cited  
12 prior references, the Applicants submit that such claims are clearly patentable.  
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1                   9.       Therefore, it is respectfully submitted that the present '101 Application is now  
2 in condition for allowance and issuance of a Notice of Allowance of the '101 Application is  
3 respectfully solicited.  
4

Respectfully submitted,

5  
6 Date: August 6, 2007

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